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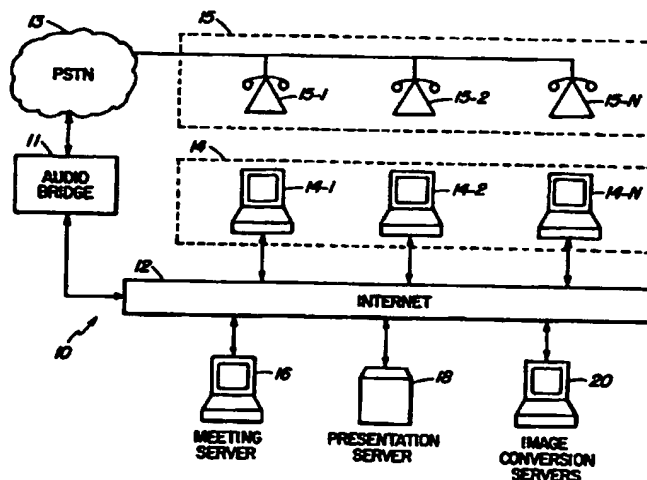
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(54) Title: MULTIMEDIA DOCUMENT CONFERENCING SYSTEM



(57) Abstract

A multimedia documents conferencing system (10), having a data communications network (12) coupled to which are a plurality of client stations (14), a meeting server (16) and a presentation server (18). The system is embodied by a client-server based collaborative application that allows users to share multimedia documents on any of PC, MAC or UNIX based hardware platforms. A "meet me" approach may be scaled to support a practically unlimited number of simultaneous users for sharing and accessing different multimedia documents at the same time. The client-server architecture allows centralized billing, secure document storage and secure document transmission, and centralized administration. Multiple clients may interface with the server or servers via a telecommunications network (13) and the data communications network which preferably is the Internet, whereby users at geographically dispersed locations are able to participate in a meeting session.

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MULTIMEDIA DOCUMENT CONFERENCING SYSTEMBackground Of The Invention

5 The present invention relates generally to collaborative groupware conferencing systems and, in particular, to a multimedia system for conferencing audio together with electronic document sharing and presentations.

10 Collaborative systems that allow users at remote locations to share multimedia documents electronically via computer platforms are known. The prior art systems for collaborative application sharing are for the most part peer to peer (e.g., point to point) with no or very limited
15 multimedia document conferencing capabilities and no interworked audio conferencing capabilities. For example, the Network MCI Document conferencing system currently supports at most 24 simultaneous users, on a Windows PC operating system only. Most prior art systems do not
20 support centralized billing, security and administration options. The prior art systems have limited data conferencing capabilities and do not support large numbers (i.e., greater than 24) of users to share a document simultaneously. Prior art systems are also typically
25 restricted to a single type of hardware platform, either Macintosh (MAC) or personal computer (PC). Prior art systems are often restricted to a particular transport medium, such as an analog phone line. Finally, many prior art systems only allow electronic documents produced using
30 a particular application to be shared.

Summary Of The Invention

35 It is an object of the present invention to provide a new and improved presentation conferencing system.

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The invention, therefore, according to a first aspect provides in combination a plurality of client stations and at least one server which communicate through a data network, a method of conferencing the client stations for presentations of electronic documents, comprising the steps of: maintaining meeting information which includes, for individual meetings, identifiers corresponding to respective client stations associated with each meeting; requesting, by one of the plurality of client stations, a presentation from the at least one server, the presentation request including an identifier of the one client station and an indication of an electronic document; correlating the identifier from the presentation request to a particular meeting from the maintained meeting information; sending, by the at least one server, the electronic document to the client stations whose corresponding identifiers are associated with the particular meeting; and presenting the electronic document by each client station at which it is received.

According to a second aspect, the invention provides in combination a plurality of client stations and at least one server which communicate through a data network, each client station including a browser, a method of conferencing the plurality of client stations for presentation of an electronic document, comprising the steps of: requesting, by one of the plurality of client stations, a presentation from the at least one server, the presentation request includes an indication of the electronic document; sending, by the at least one server, a browser compatible document including a reference to the electronic document corresponding to the indication from the presentation request, to the plurality of client stations; at each client station receiving the browser compatible document, processing the received document by the browser which resolves the reference and requesting the corresponding electronic document from the at least one server; sending, by the at least one server, the electronic

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document to each client station from which the request for that document is received; and presenting the electronic document by the browser of each client station at which it is received.

5 According to a third aspect, the invention provides a multimedia conferencing system, comprising: a plurality of client stations, at least one server, and a data network via which the plurality of client stations and the at least one server communicate; wherein the at least
10 one server includes: means for maintaining meeting information which includes, for individual meetings, identifiers corresponding to respective client stations associated with each meeting, means for correlating an identifier from a received presentation request to a
15 particular meeting from the maintained meeting information, and means for sending an electronic document indicated in the received presentation request to the client stations whose corresponding identifiers are associated with the particular meeting; and wherein each client station
20 includes: a man-machine interface through which a user interacts with the system, a browser adapted to display electronic documents, means for requesting, if the client station is designated as presenter, a presentation from the at least one server, the presentation request including an
25 identifier of the client station and an indication of an electronic document, and means for presenting the electronic document by the browser.

The invention may be embodied by a client-server based collaborative application that allows users to share
30 multimedia documents on any of PC, MAC or UNIX based hardware platforms. A "meet me" approach may be scaled to support a practically unlimited number of simultaneous users for sharing and accessing different multimedia documents at the same time. The client server architecture
35 allows centralized billing, secure document storage and secure document transmission, and centralized administration. Multiple clients may interface with the

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server or servers via a telecommunications network and a data communications network which preferably is the Internet, whereby users at geographically dispersed locations are able to participate in a meeting session.

- 5 Any document file that can be converted to a postscript file may be utilized in a particular implementation of the invention.

The invention may be effected on any computer platform that supports a MAC, PC or UNIX based operating
10 system, and users with different computer platforms can still share documents simultaneously. The invention may incorporate security mechanisms to ensure secure transmission and storage of documents, as well as secure document sharing.

15

Brief Description Of The Drawings

The invention will be better understood from the following description of a multimedia presentation
20 conferencing system together with reference to the accompanying drawings, in which:

Figure 1 is a schematic representing an embodiment of the multimedia conferencing system;

Figure 2 is a block diagram depicting various
25 software modules and interactions therebetween, executed by the system of Figure 1;

Figure 3 is a flow chart illustrating a process of making presentations available for sharing at a meeting;

Figure 4 is a flow chart illustrating a process of
30 adding a meeting participant to an audio conference call that includes other meeting participants; and

Figure 5, consisting of sections 5A, 5B, 5C and 5D, is a flow chart illustrating a process of viewing a presentation by meeting participants;

35 Figure 6 is a flow chart illustrating a process of advancing to a next page of the presentation; and

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Figure 7 is a flow chart illustrating a process of making a index of all pages in the presentation available to a user.

5

Detailed DescriptionMULTIMEDIA CONFERENCING SYSTEM ARCHITECTURE

Referring to Figure 1, illustrated is an embodiment of a multimedia conferencing system 10, in accordance with the present invention, which is based on a client-server architecture whereby a multi-site collaboration involving audio conferencing together with document and information sharing between users, who can be at various and different locations, may be effected. The presentation conferencing system 10 comprises a data communications network, for instance, the Internet 12 communicatively coupled to which is a plurality of client stations 14, a meeting server 16, a presentation server 18 and an image conversion server 20. Also connected to the Internet 12 is an audio conference bridge 11 which interfaces with a telecommunications network, typically a public switched telephone network (PSTN) 13, and to which are communicatively coupled a corresponding plurality of telephony terminal devices 15, such as telephone sets.

Each client station 14, individually labelled 14-1, 14-2 to 14-N in Figure 1, constitutes a man-machine interface (MMI) through which the user is able to interact with the multimedia conferencing system 10. Features of the system 10 that may be accessed at any of the client stations 14 includes: meeting scheduling and administration; making electronic documents available for sharing through automatic format conversion; joining and switching a meeting; administering an active meeting; making and viewing presentations in a meeting; and setting up an audio conference call amongst all meeting participants. The client stations 14 communicate via the

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Internet 12 with the meeting server 16, the presentation server 18 and the audio bridge 11 to effect these system features.

Furthermore, each of the client stations 14,
5 meeting server 16, presentation server 18 and conversion server 20 may be equipped with conventional cryptography capabilities, for example Nortel's Entrust product, whereby data and documents may be securely transmitted and stored within the conferencing system 10. The data and documents
10 to be transmitted via the Internet 12 are first encrypted at the transmitting device and subsequently decrypted at the receiving device using algorithms provided by Entrust.

Associated with each of the client stations 14, namely stations 14-1, 14-2 and 14-N, may be a corresponding
15 telephony device 15-1, 15-2 and 15-N, respectively, by which participants of a particular meeting session may effect voice communications. The audio conference bridge 11 is conventional equipment that provides the functionality to start, control and terminate an audio
20 conference through the PSTN 13 between the telephony devices 15. The meeting server 16 instructs the audio conference bridge 11 in order to add the telephony devices 15 being used by participants to an audio conference call, and it may also instruct the bridge 11 to delete a meeting
25 participant from the audio conference call.

The meeting server 16 is responsible for maintaining meeting information and meeting control in connection with all meetings, including the ability to start and control an audio conference call via the audio
30 conference bridge 11. It also provides functionality for scheduling of meetings.

The presentation server 18 characterizes a world wide web server which functions to store and distribute presentation images.

35 The image conversion server 20 provides functionality to convert a source document file having a number of presentation views to a graphics format

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consisting of sequential and indexable images compatible with that supported by the presentation server 18. The source document file may be generated or provisioned by a user at any of the client stations 14 employing an appropriate software application for this purpose. From that client station 14, the source document file may be first translated into a standard postscript image format, compressed electronically, and then transmitted over the Internet 12 to the conversion server 20 which decompresses and converts the presentation views to the compatible image format. In turn, the conversion server 20 transmits the converted image file via the Internet 12 to the presentation server 18.

According to a particular configuration for the presentation conferencing system 10, the client stations 14 may be implemented by conventional data processing hardware, such as, personal computer and Macintosh platforms. Preferably, these hardware platforms are equipped with the typical combination of keyboard and mouse for accepting user input, a colour monitor supported by graphic capabilities, and an Ethernet interface for linking to the Internet 12. The meeting server 16 and the presentation server 18 may also be implemented using conventional processing hardware, for example, by Macintosh and UNIX based web servers, respectively. The audio conference bridge 21 may be implemented, for example, by a DSP Motorola 56000 chip set integrated on a PC hardware platform. Both a Macintosh based server or a Unix based server may be utilized to implement the conversion server 20, in order to effect the conversion process, for example, on Powerpoint generated source images files. Powerpoint is a well known software application for creating presentations in the form of one or more sequentially indexable image slides and includes the ability to output postscript files of these image slides. The conversion server 20 then converts the postscript file to a presentation file in "gif" format.

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Although the meeting server 16, presentation server 18, conversion server 20 and audio conference bridge 21, according to this particular configuration, are implemented on separate physical platforms, it should be apparent to one skilled in the art that the functionality effected by these respective entities may readily be collocated on a single processing platform as another embodiment. Moreover, the functionality of the conversion server 20 may be implemented directly on one or more of the client station 14 platforms.

Having regard now to Figures 1 and 2 together, software processes executed by the hardware components of the client server architecture of Figure 1 are represented by modules in Figure 2. Process modules provisioned in each client station 14 includes a man-machine interface (MMI) 22 and a world wide web browser 24, both of which interact with a TCP/browser interface 26. The MMI 22 manages an intuitive graphical based system interface whereby input is received from the keyboard/mouse and output displayed on the monitor of the client station 14 interacting with a user. Macromind Director is a commercially available product which together with a library of suitable graphic images may be utilized to construct the MMI 22. The browser 24 is also commercial technology, such as the Netscape WWW browser, that represents a standard application programming interface (API). The browser 24 provides the means by which image slides in "gif" format are displayed at the client station 14. A TCP/browser interface 26, which may be implemented as an Applescript module for Macintosh platform based clients, communicatively links together the MMI 22 and the browser 24, and also performs the TCP communications to the meeting server 16 over the Internet 12. Alternatively, the browser 24 and MMI 22 may be integrated into a single process, for example, by constructing a man-machine interface using standard web page construction tools such as HTML, JAVA, and SHOCKED.

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Meeting control 28, presentation control 30 and audio conference control 32 are software modules executed by the meeting server 16, the presentation server 18 and the audio conference bridge 11, respectively. Presentation control includes a number of processes, referred to herein as presentation processes 31 which are individually labelled 31-1 through 31-N, such that there is a process instance for each client 14 that is a participant of an active meeting. The meeting control 28 is provided in the form of an Applescript and/or compiled C code that maintains the meeting information in a central repository including all of the scheduling. It is also the main controller for the meeting and interacts with the audio conference control 32 for conferencing the appropriate telephony devices 15. The audio conference control 32 is provided in the form of M56000 assembler and C code that effects an audio conference bridge control algorithm, and a particular implementation may employ the Nortel M1 conference bridge algorithm. The presentation control 30 operates as a web server that drives the image presentation to the client web browsers 24. This software is written in the language of the web, namely Practical Expression Reporting Language or PERL, and/or compiled C code, to drive all the browser based client stations 14. The presentation control 30 recognizes certain control commands, such as, next, previous, stop and index, responsive to which it simultaneously updates the presentation at all clients by transmitting automatically to the browser 24 of each client station 14 the new "gif" image. It also sends lists of available presentations to the meeting control 28.

The various software modules interact using platform and industry standard protocols. On the client side, communications between the MMI 22 and TCP/browser interface 26 and between the TCP/browser interface 26 and web browser 24 may be carried out, for instance, via Apple Events for a Macintosh platform. Communications between

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the TCP/browser interface 26 and meeting control 28 is via TCP/IP as are communications between meeting control 28 and audio conference control 32. The TCP/IP protocol is also used between the web browser 24 and presentation server 30.

5

MULTIMEDIA CONFERENCING SYSTEM OPERATION

The following describes in more detail the processes effected by the client stations 14 in conjunction with the meeting server 16, presentation server 18 and conversion servers 20 for the various features supported by the presentation conferencing system 10.

Making An Audio Conference Call

15

Once joined in a meeting by the meeting server 18, the meeting participants can share a common conference audio path via the audio conference bridge 11, as well as sharing data via the presentation server 18. Whether or not an audio conference path is present is specified by the user upon scheduling the meeting (see Section "Meeting Scheduling and Administration").

Users have access to an audio conference call via the meeting control 28 whenever a meeting is under way and an audio conference call is available on the audio conference bridge 11, and an audio conference call was requested when the meeting was scheduled. The users will have access to the audio conference call regardless of that persons geographic location via the public switched telephone network 9.

In order to join all the participants in a particular meeting in an audio conference call, the meeting control process 28 of the meeting server 16 obtains the phone number of each participant's audio telephony device 15 via the MMI 22. The user inputs the number of their telephony device into the MMI 22 and the number is sent to meeting control 28 via the Internet and TCP/IP. The phone

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numbers may be provided when the meeting is scheduled or, if not provided at that time for one or more of the participants, the meeting control will request a phone number as each of those participants attempts to join a
5 meeting.

The meeting control process 28 obtains the phone number(s) required by the audio conference control 32 to set up the audio conference bridge call on the audio conference bridge 11 either: (1) via the MMI 22, or (2) by
10 requesting this information directly from the audio conference control 31. If the user provides the information, then this information is sent via the MMI 22 to meeting control 28 via the Internet and TCP/IP. It is noted that the number of phone numbers required to set up
15 an audio conference call on the audio conference bridge 11 is dependent upon the audio conference call control algorithm implemented in 32. The current implementation M1 uses two numbers - a chair number and a participant number. If the numbers are provided by audio conference control 32,
20 then meeting control 28 sends a request to audio conference control 32 via the Internet and TCP/IP for an audio conference call of size N, where N is the number of participants in the meeting. Using an audio conference call algorithm such as M1, the audio conference control 32
25 allocates N voice ports on the audio conference bridge 11. The audio conference control 32 then calls each users telephony device 15, using the user telephony device's phone number provided by meeting control 28.

The process of adding a single user to a
30 conference call is described below in section Joining A Meeting.

Additional audio conference control features implemented by the audio conference control 32 (i.e., deleting participants) are manipulated by the meeting
35 control 28 by sending additional messages to the audio conference control 32 via the Internet 12 and TCP/IP. The MMI 22 and meeting control 28 currently support those audio

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conference control features that allow the addition of a user to an audio conference call and the deletion of a person from an audio conference call. If an audio conference call exists or is desired, then every
5 participant in a meeting is added to the conference call when they join the meeting and dropped when they leave the meeting.

Making Presentations Available

10

In order to make presentations available for sharing at a meeting, copies of all image presentations are maintained in central repository, namely at the presentation server 18. Once there, users will have access
15 to the presentations when a meeting is under way regardless of that persons geographic location, via the Internet 12. Presentations may be copied to the presentation server 18 in advance or placed there during a meeting.

Making presentations available begins by
20 converting presentation (e.g., image) document files not already in the "gif" graphics format, in this particular implementation Powerpoint slide files, to that graphics format. Referring to Figure 3 and specifically step 40, the conversion process may be initiated by a user simply
25 dropping the Powerpoint slides file onto an appropriate icon provided by the MMI 22 module at any of the client stations 14. At step 42, the user is requested to input a name of a folder into which the corresponding "gif" file will eventually be place on the presentation server 18.
30 For example, the folder name may be the actual name of the user. Other information the user may input includes: the owner (may not be the folder owner); a presentation title; and a presentation abstract. The client station 14 may further add the date the presentation file was submitted
35 and an optional "by whom" entry, and an identification or representation of the source application for the

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presentation (e.g., a Powerpoint icon) to the inputted information corresponding to the image file.

The presentation document file is converted into the desired image format as follows. First, at step 44,
5 the document file is converted into a postscript file on the client, for example, by using the standard printer drivers supplied with the client platform by the platform vendor. The postscript file also may be compressed using a well known compression application such as STUFFIT. At
10 step 46, the compressed postscript file is sent to the conversion server 20 via the Internet using TCP/IP. On the conversion server 20, step 48, the postscript file is decompressed and converted into the desired "gif" image format using a conversion application such as Ghostscript.
15 Each page of the converted document is a separate image. Step 50, the converted document together with the user inputted information are then sent to the presentation server 18 via Internet TCP/IP and, step 52, stored on the server's hard disk in the folder which is identified as
20 part of the input information.

Furthermore, the user through the MMI 22 at any client station 14 is able to look at presentation files that they might have stored on the presentation server 18 and delete them if so desired. Each presentation in a
25 user's folder should be distinct (i.e., a separate item or file in the folder). The user file folder may be password protected if the user desires, in which case when a user copies a presentation to the server 18 they will be prompted for their name and password if they already have a
30 file. If they do not have a file they will be prompted for a new password. The user is able to open the filing cabinet and search through the password protected file folders either by flicking tabs or by entering a search string.

35 Upon viewing a set of presentations available on the presentation server 18, the user is able to initiate a meeting session for a particular presentation file

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immediately. This will have the effect of executing a "meet now" command sequence and result in a meeting being set up with the selected presentation viewable to all attendees associated with the presentation (see section 5 Viewing Presentations In A Meeting).

Meeting Scheduling And Administration

Users of the system are able to pre-schedule meetings and to hold a meeting immediately without pre-scheduling. Once scheduled, information associated with the meeting is stored on the meeting server 16 in a central repository. Information about all scheduled meetings may be reviewed at the client stations 14 by retrieving this 15 information from the meeting server 16 via the Internet using TCP/IP based messaging.

In order to schedule a meeting, a user at any of the client stations 14 is provided by the MMI 22 with an interface that allows him or her to enter the following 20 information:

- 1) Name of a meeting chair and a meeting subject.
- 2) A request for an audio conference call to be held amongst meeting participants.
- 3) Time, date and physical location of the organizer 25 of the meeting (i.e., meeting chair). The time includes a specification of the time zone (e.g., pacific standard time, mountain standard, etc.). Date is assumed to be any date from now into the future. Place specifies a physical location such as a meeting room, desk location, etc.
- 30 4) List of meeting attendees or participants. This list may be empty and completion is optional. The user will be able to search a database of names with corresponding telephone directory numbers (DNs) to facilitate completion of the attendees list, by using a 35 search engine provided through the MMI. It allows searching by last name, and may be adapted for searching by a company name, by department, company division, etc. The

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MMI allows the user to directly enter a telephone number (DN) and/or name. When a name is entered, it is checked against the database and if found, the name and corresponding telephone number are added to the attendee list. If the name does not exist in the database, the user will be prompted to enter a number for that person and the result is added to the attendee list.

5) An optional meeting password is used to provide all attendees with controlled access to the meeting.

10 6) An optional meeting abstract which may be taken (e.g., cut and pasted) from an existing document or entered via the keyboard by the user.

When the user has entered in the meeting information via the MMI, the information is sent to the meeting server 16 via the Internet 12 using the TCP/IP protocol. The information is recorded on the meeting server 16 and may be sent to any currently active client stations 12 that are identified as attendees of the meeting.

20 If the user wishes to hold a meeting immediately, the meeting server 16 records this fact, marks the meeting as currently active and presents that information in the MMI 22 at the client station 14. At this point all documents on the presentation server 18 are visible to the user. If an audio conference call is required, then meeting control 28 initiates the conference call as described in section Making An Audio Conference Call.

Through the MMI 22 at any of the client stations 14, a user may request to view all the pre-scheduled meetings stored on the meeting server 16, for instance, by week, day, month and year. Scheduled meeting information is sent by the meeting control 28 process executing on the meeting server 16, via the Internet using TCP/IP, to the client machine 14 which requested the information. The user can review through an interface provided by the MMI 22 a meeting schedule for a particular day, and see at a

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glance what meeting are already scheduled and where they are being held.

Joining A Meeting

5

A user can look at the scheduled meetings via the MMI 22 provided by the meeting server 16 to the client station 14. The user can select a specific meeting via the MMI 22 to attend if it is scheduled to start in the current
10 time frame, for example, approximately 15 minutes prior or any time after start of the meeting. Hence, the user can attend the meeting before it actually starts such that should the user arrive in advance of the scheduled start, say 10 minutes early, he or she is able to join the meeting
15 and wait for the others to join. The user knows via the MMI 22 if the meeting they wish to join has already started or if it already has people waiting for it to start. This information is present in the meeting schedule interface facilities of the MMI 22.

20 When a user selects a meeting to join in the MMI, the MMI 22 prompts them for their name. If the user's name is on a list of attendees for that meeting provided by the meeting server 16 as part of the information about that meeting, then the user is asked to enter a password if the
25 meeting is designated as being password protected in the meeting server 16. If the user's name is not on the list of attendees, he or she is informed of the fact via the MMI and may be told that the current meeting attendees will be informed of this user's request to join. The MMI 22 allows
30 the user to abort this process.

The current attendees will receive a message informing them that the user who is identified wishes to join, and either that this user is not on the list of attendees and wishes to join the meeting or that the user
35 is joining as he or she is on the list. In both cases this notification is discrete and will not in any way obscure a

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presentation if there is already one on the screens of respective participants.

When a user issues a request to join a meeting, any information that they have provided via the MMI 22 is sent to the meeting server 16 via the Internet using TCP/IP. Upon receipt of the information, the meeting server 16 acknowledges the user and either accepts or rejects the request to join a meeting using the meeting control process 28. If the request to join is accepted then the client 14, from which the request to join was received, is assigned a unique identifier (ID) consisting of an ID for the particular meeting and an ID that is unique to the particular client (e.g. IP address). If the request is accepted, the user is added to the list of current attendees on a meeting database located on the meeting server 16 for that meeting by meeting control 28, and this information is sent by the meeting server 16 to all current attendees 14 with the same meeting ID via the Internet and TCP/IP and presented in their MMI 22.

If the current attendees are viewing a presentation via their respective browsers 24 and controlled by the presentation server 18, then the meeting server 16 sends a request to the presentation server 18 to present the document at the current image page on the newly joined user's client station 14 via the MMI 22 and browser 24. The meeting control 28 requests that presentation control 30 start a presentation process 31 for the client machine 14. The presentation process 31 is uniquely associated with the particular client station 14 by using the unique ID provided by the meeting server 16. Once started, the presentation control process 31 tells the client's browser 24 to display a particular image. The image is the same for all current meeting participants.

When an individual joins the meeting, the meeting server 16 is notified of this fact via the Internet network using TCP/IP. If an audio conference call exists, then the meeting server 16 sends a request to the audio conference

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bridge 11 to add the user to the conference call using the algorithm embodied in the audio conference control 32. Figure 4 illustrates the steps effected to add the user to the conference call.

5 Step 60, the meeting server obtains the directory/phone number of the telephony device associated with the user. The number may have been provided when the meeting was scheduled. If required, the meeting server 16 will request that the client 14 provide a number for the
10 telephony device that they wish to use for the audio conference call via the Internet and TCP/IP. The client 14 is given the number by the user via the MMI 22 and the number is sent to meeting control 28 via the Internet and TCP/IP.

15 Step 62, meeting control 28 provides the number in an "add" request message, via the Internet and TCP/IP, to the bridge 11 in which the audio conference control 32, at step 64, adds the number to the list it maintains for the conference. Step 66, the conference control 32 effectively
20 dials the number at the PSTN 13 which, step 68, rings the user's telephony device. The user, upon answering, is added to the conference call.

Viewing Presentations In A Meeting

25

Figure 5 illustrates an exemplary process for viewing a presentation under the control of a user as the presenter. In the following description, reference is made to the steps depicted by Figure 5 in conjunction to the
30 hardware and software elements of the conferencing system depicted by respective Figures 1 and 2.

The user, at step 70, accesses the multimedia conferencing system 10 through a client station 14, similar to any system user.

35 The user can look through a list of available presentations displayed in the MMI 22 of the client station 14. At step 71, information for generating the list of

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available presentations is requested by the client 14 from the meeting server 16. The meeting server 16 sends the presentation information stored on the presentation server 18 to the client 14 via the Internet 12 and TCP/IP. The presentation information is then displayed in the MMI 22.

Steps 72 to 79 illustrate the procedure followed by this user to initiate a meeting.

From the list of available presentation displayed on the client station 14, at step 80, the user may select through the MMI 22 a presentation for the meeting being initiated.

Upon selecting a presentation, the user pushes a "button" in the MMI 22 whereby the first image of the selected presentation document (e.g., each presentation consists of a sequence of images stored as individual GIF images) is displayed on the monitor of the user's client station 14 via a browser 24 window. By pushing the button, step 81, this user's client sends a command to the meeting server 16 that they wish to present the selected presentation. This user who initiates the process becomes known as the "Presenter".

Step 82, the meeting server 16 contacts the presentation server 18 in which the presentation control 30 asks each presentation process 31 associated with a participant/attendee of the current meeting to show the desired image in the corresponding client's WEB browser 24. Step 83, each presentation process 31 sends to its associated client 14 a document (e.g. HTML file) that references a presentation page, say image 1 of the presentation. Step 84, as a result of these client stations 14 receiving the document, each client's WEB browser 24 requests and displays image 1 of the selected presentation.

Step 85, in addition to image 1 of the selected presentation, the Presenter's WEB browser 24 displays the following buttons: "Next", "Previous", "Stop", "Index".

- 20 -

Step 86, an appropriate response is generated according to which button is pressed by the Presenter.

Turning to Figure 6, once the Presenter has successfully started a presentation, step 90, he or she can
5 push the "Next" button to get the next page in the presentation. When the "Next" button is pushed, a command is sent from the client station 14 to the presentation server 18 that includes the number N of the next image in the presentation, step 91. The presentation process 31
10 corresponding to the Presenter on the presentation server 18 receives the command and, step 92, informs the meeting server 16 that the meeting presenter has moved to page N.

Step 93, the presenter's presentation process 31 also sends a document that references image N to the client
15 station 14 of the Presenter. The Web browser 24 on that client interprets the document and requests image N of the current presentation from the presentation server 18, step 94. The presentation server 18 sends image N to the client's browser 24 and the image is displayed.

20 Step 95, the meeting server 16 computes the current participants in the meeting (i.e., all attendees with the same meeting ID). Concurrently to steps 93 and 94, the meeting server 16 notifies the presentation processes 31 on the presentation server 18, which processes
25 31 correspond to the current attendees, that the displayed presentation should be updated to image N, at step 96. Each presentation process 31, at step 97, sends to their associated WEB client 14 a document that references slide N. Step 98, each client WEB browser 24 interprets the
30 document, resolves the reference to image N and asks the presentation server 18 for the image. Subsequently, the updated image is shown in each client WEB browser 24.

The process of updating the images shown by each client's WEB browser via a multiple client push from the
35 server, in accordance with the present invention, is preferred characteristic of the multimedia conferencing system 10. The update is simultaneous across all clients.

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The presentation server 18 in this particular implementation has been coded using custom software to allow the simultaneous updates of multiple displays.

5 A "Previous" button is provided that has the functionality of going to the previous page in the presentation. An "Index" button provides the user with a series of 'thumbnails' for each page in the presenter. Exemplary processing effected in response to pressing the "Index" button is illustrated in Figure 7. Selecting any
10 thumbnail tells the presentation server 18 to present that page in the WEB browser 24 of each client 14. The "Previous", "Next" and "Index" buttons all result in simultaneous updates on all clients. The presenter of a document also has a "Stop" button that sends a request to
15 the presentation server 18 and the meeting server 16 to stop the current presentation.

The presenter is informed when all participants have received the presentation. If someone else is already presenting, then the user will be asked to confirm that
20 they wish to "bump the existing presentation" and a message will be sent to the current presenter's machine asking if this is suitable. If the user wishing to make the new presentation is the one already presenting, this dialog will not take place. If no one is presenting, then no
25 dialog will take place.

When a user decides to present, everyone will be informed of who the new presenter is. This notification will be discrete in the same way that notification of people entering and leaving the conference will be
30 discrete.

When a user has finished presenting, there is an obvious way of quitting their presentation.

None of the features described in this section are available to any one before they have successfully joined a
35 meeting. A user will not be able to see what is being presented until they have joined the meeting.

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Administering An Active Meeting

Once joined to a meeting a user, using the MMI 22 and information provided by the meeting server 16 to the client 14, may:

- (1) Determine who is at the meeting;
- (2) Who has been invited but has not joined;
- (3) Who is currently presenting (if anyone);
- (4) Who is currently talking;
- 10 (5) Who has just joined or left the meeting;
- (6) Have access to all conference bridge functionality regardless of whether or not it is normally associated with the chair or not; and
- (7) What physical devices (computers or telephones)
- 15 the current attendees are using.

For example, any meeting participant can via the MMI 22 add a new person to the meeting by: (1) Entering a phone number into the MMI, or (2) Looking up the person in a directory located on the meeting server 16. The meeting server takes the information provided in the MMI 22 and passes it on to the audio conference control 31. Audio conference control adds the person to the audio call using the process illustrated in Figure 4. Note that the specific audio conference call functionality available to the user is determined by the functionality of the audio conference bridge. The system architecture is such that it can be interfaced with any audio conference bridge given the presence of appropriate application programming interfaces (APIs). The interface for adding a new person to a meeting is the same interface used when scheduling a meeting. All users can to view an agenda of the meeting if it has been provided.

Via the MMI 22, during a meeting a user can determine whether or not they are talking to conference rooms full of individuals or single individuals at desks. A user can send private text messages to other meeting participants via the MMI 22 by entering text via the

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keyboard or cut and paste, sending the information via the Internet to the other participants clients 14 for presentation in their MMI 22.

In addition to the above functionality a user can
5 also determine what kinds of communication devices all other meeting participants are using via the MMI by asking the meeting server 16 for the information.

None of the features described in this section may be available to any one before they have successfully
10 joined a meeting.

Future additions to the multimedia conferencing system include, but are not limited to, shared annotations of the shared electronic document, shared pointers that allow users to point to a specific location on the shared
15 electronic document, alternative browsers that support the display and sharing of other media types or formats such as MPEG II video, and the storage of the audio and data portions of a meeting for later play back.

Those skilled in the art will recognize that
20 various modifications and changes could be made to the invention without departing from the spirit and scope thereof. It should therefore be understood that the claims are not to be considered as being limited to the precise embodiment of the multimedia conferencing system set forth
25 above, in the absence of specific limitations directed to each embodiment.

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WE CLAIM:

1. In combination a plurality of client stations (14)
5 and at least one server (16, 18, 20) which communicate
through a data network (12), a method of conferencing the
client stations for presentations of electronic documents,
comprising the steps of:

maintaining meeting information which includes,
10 for individual meetings, identifiers corresponding to
respective client stations associated with each meeting;

requesting, by one of the plurality of client
stations, a presentation from the at least one server, the
presentation request including an identifier of the one
15 client station and an indication of an electronic document;

correlating the identifier from the presentation
request to a particular meeting from the maintained meeting
information;

sending, by the at least one server, the
20 electronic document to the client stations whose
corresponding identifiers are associated with the
particular meeting; and

presenting the electronic document by each client
station at which it is received.

25

2. In combination a plurality of client stations (14)
and at least one server (16, 18, 20) which communicate
through a data network (12), each client station including
30 a browser (24), a method of conferencing the plurality of
client stations for presentation of an electronic document,
comprising the steps of:

requesting, by one of the plurality of client
stations, a presentation from the at least one server, the
35 presentation request includes an indication of the
electronic document;

- 25 -

sending, by the at least one server, a browser compatible document including a reference to the electronic document corresponding to the indication from the presentation request, to the plurality of client stations;

5 at each client station receiving the browser compatible document, processing the received document by the browser which resolves the reference and requesting the corresponding electronic document from the at least one server;

10 sending, by the at least one server, the electronic document to each client station from which the request for that document is received; and

 presenting the electronic document by the browser of each client station at which it is received.

15

3. A multimedia conferencing system, comprising:
 a plurality of client stations (14),
 at least one server (16, 18, 20), and

20 a data network (12) via which the plurality of client stations and the at least one server communicate;
 wherein the at least one server includes:

 means for maintaining meeting information which includes, for individual meetings, identifiers
25 corresponding to respective client stations associated with each meeting,

 means for correlating an identifier from a received presentation request to a particular meeting from the maintained meeting information, and

30 means for sending an electronic document indicated in the received presentation request to the client stations whose corresponding identifiers are associated with the particular meeting; and

 wherein each client station includes:

35 a man-machine interface (22) through which a user interacts with the system,

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a browser (24) adapted to display electronic documents,

means for requesting, if the client station is designated as presenter, a presentation from the at least one server, the presentation request including an identifier of the client station and an indication of an electronic document, and

means for presenting the electronic document by the browser.

10

4. A method as claimed in claim 1, wherein the electronic document includes an image media.

15

5. A method as claimed in claim 4, wherein the image media is GIF format.

20

6. A method as claimed in claim 4, wherein the electronic document includes an audio media.

25

7. A method as claimed in claim 6, wherein the electronic document includes a video media.

30

8. A method as claimed in claim 7, wherein the video media is MPEG format.

35

9. A method as claimed in claim 7, wherein the electronic document includes an annotation media.

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10. A method as claimed in claim 1, wherein the at least one server includes a meeting server (16) which maintains the meeting information.

5

11. A method as claimed in claim 10, wherein the at least one server includes a presentation server (18) which sends the electronic document to the client stations.

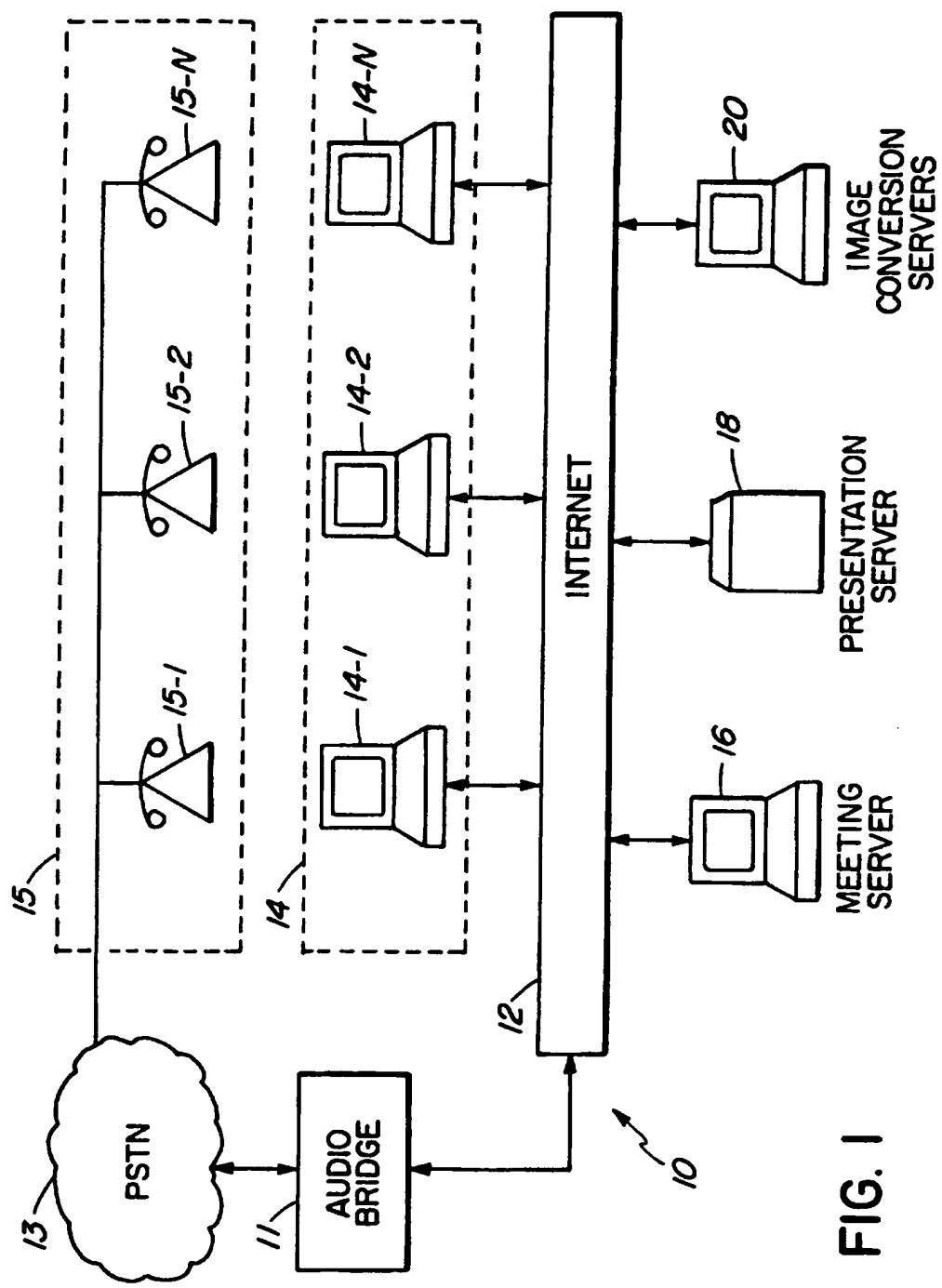


FIG. 1

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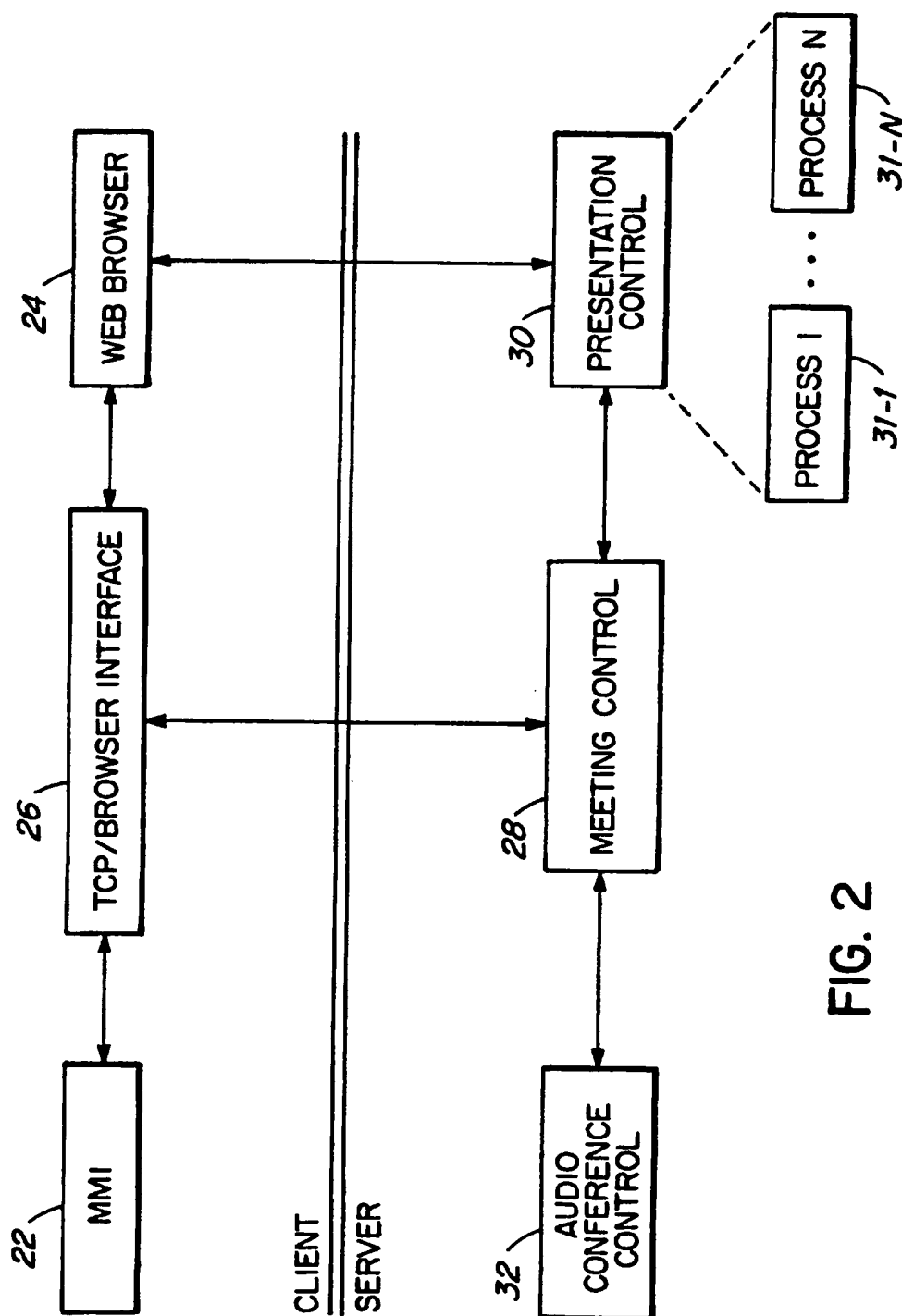


FIG. 2

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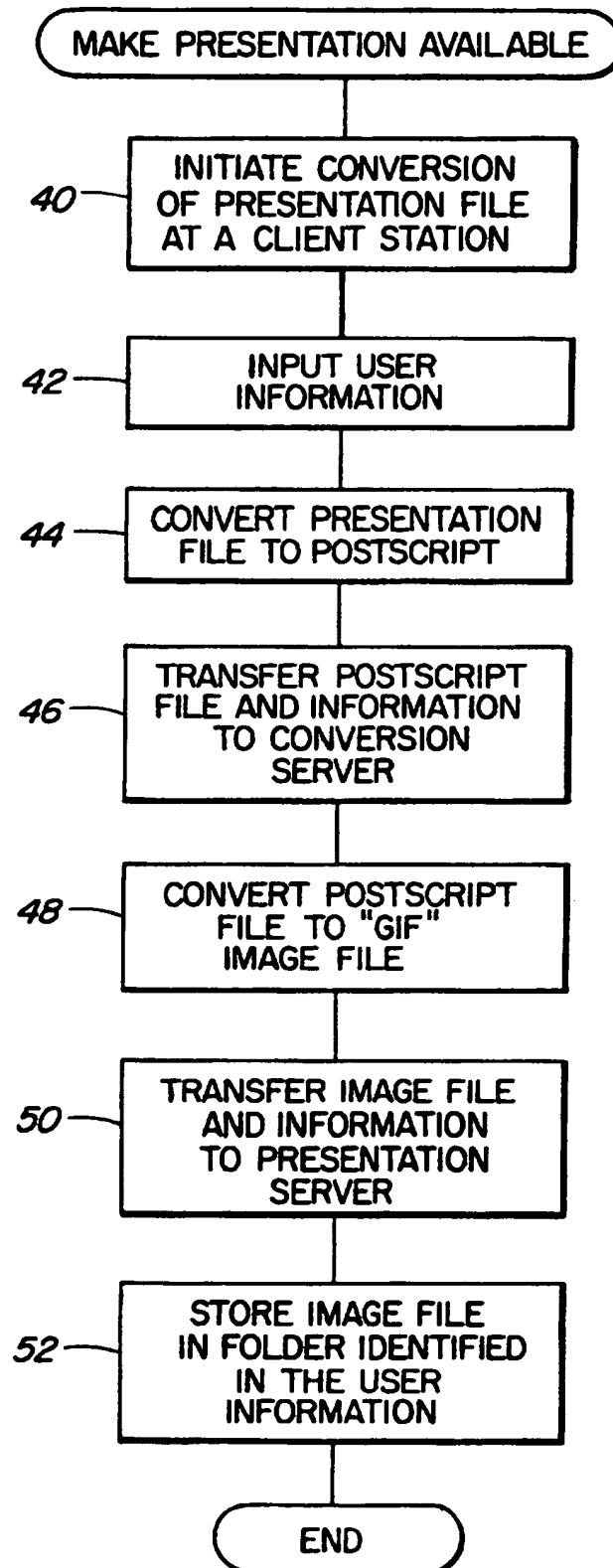


FIG. 3

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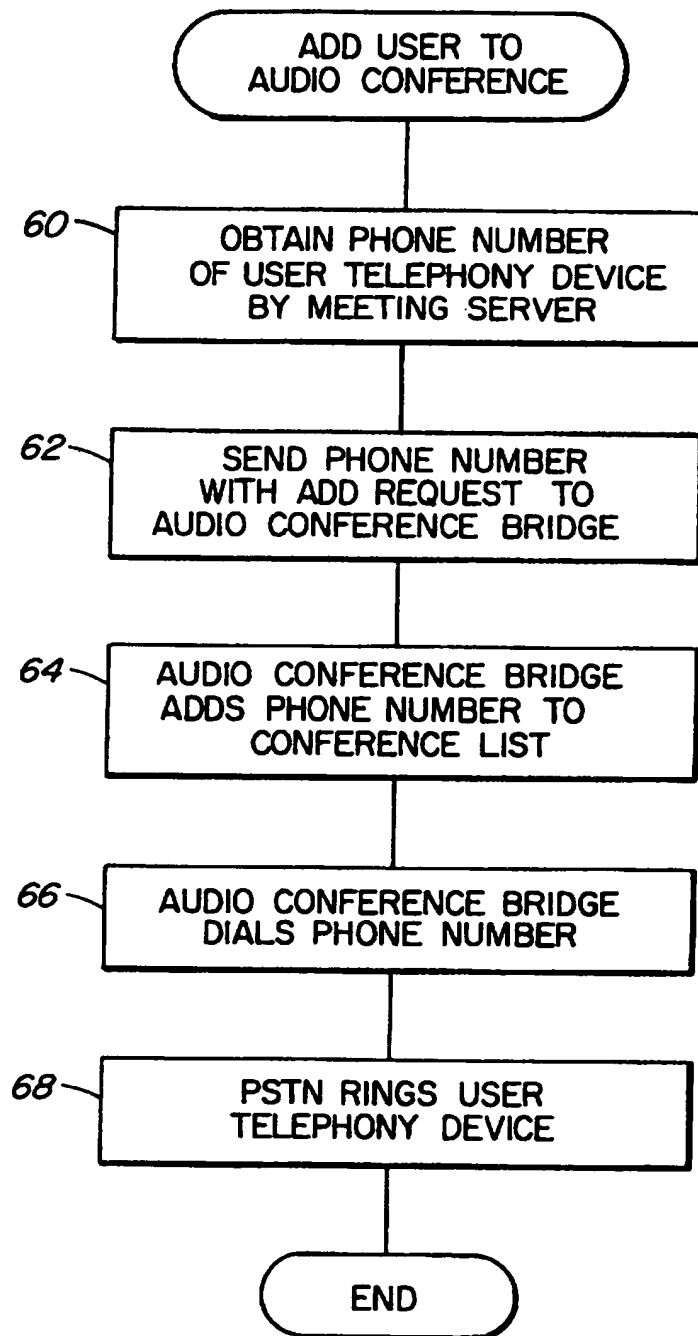


FIG. 4

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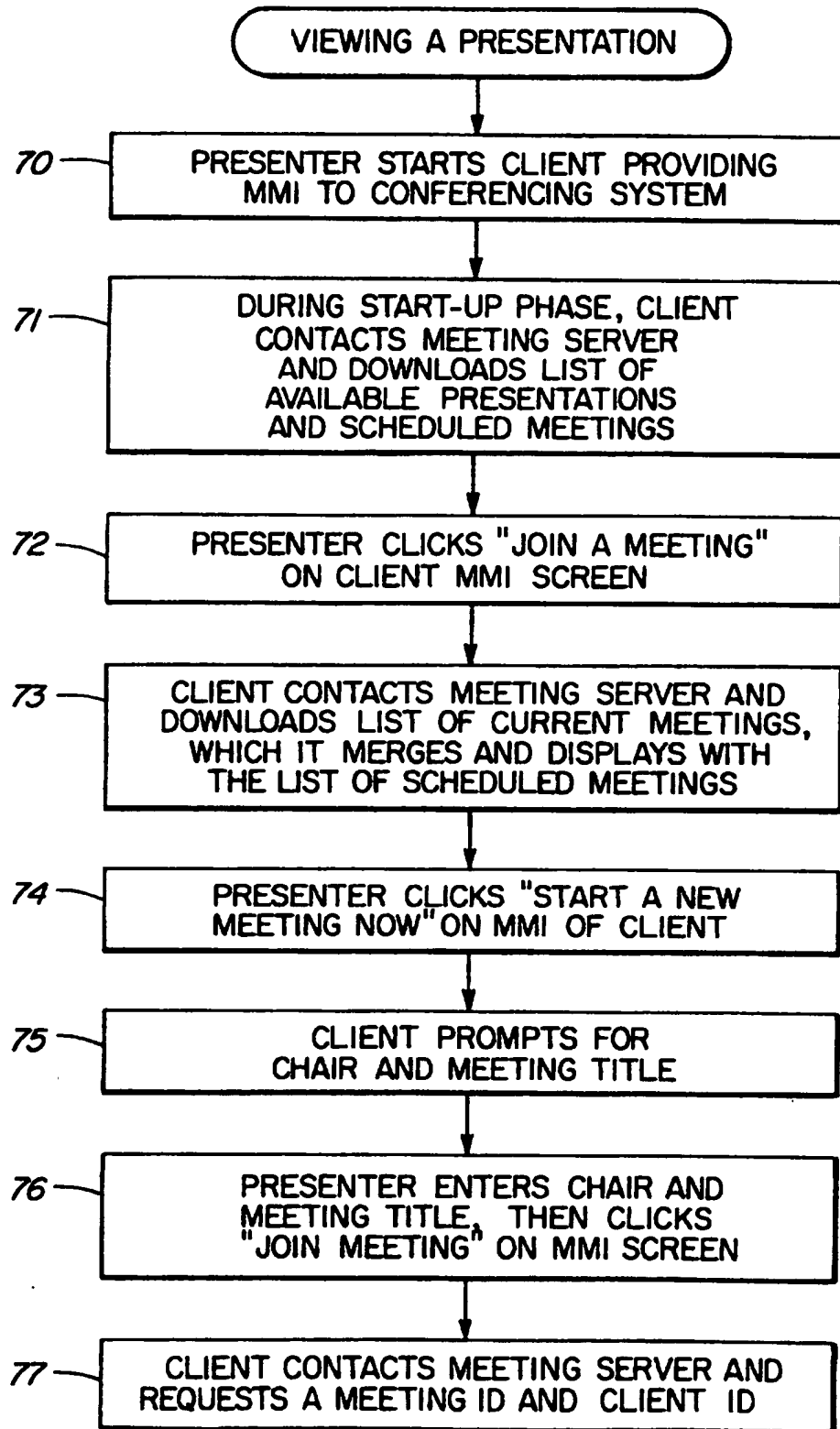


FIG. 5A

A

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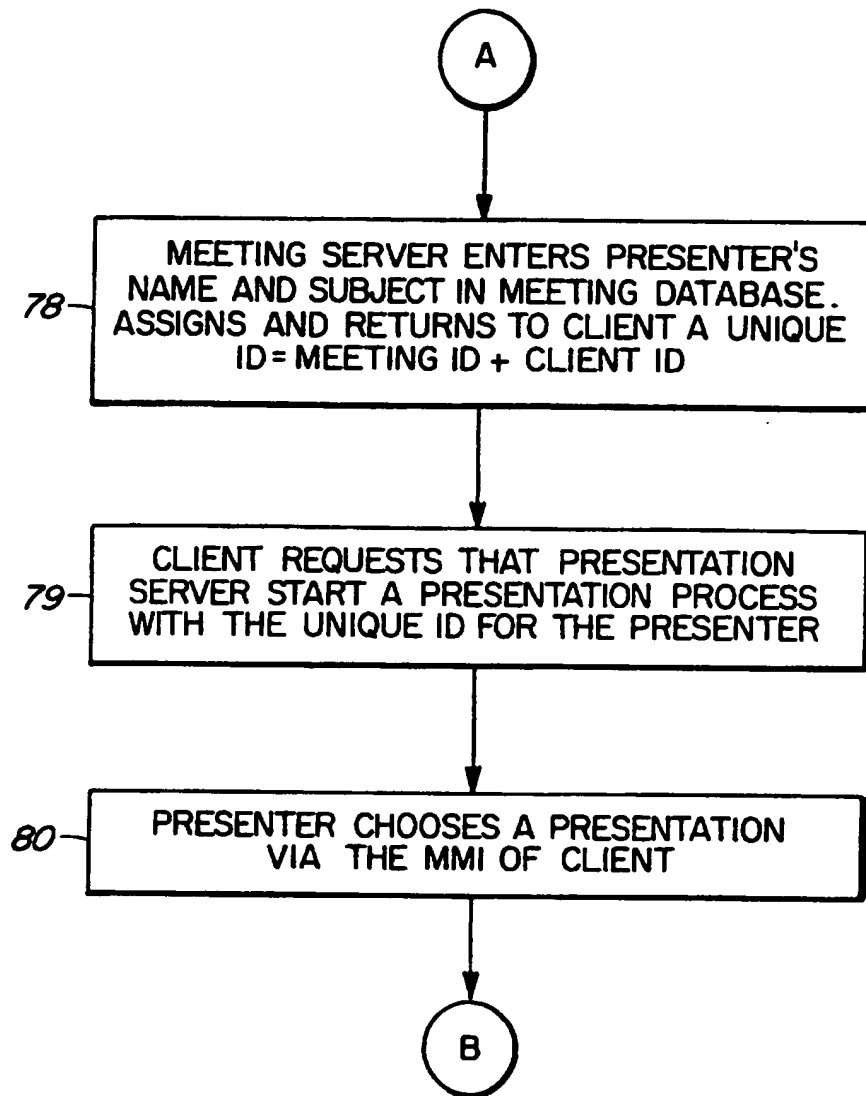


FIG. 5B

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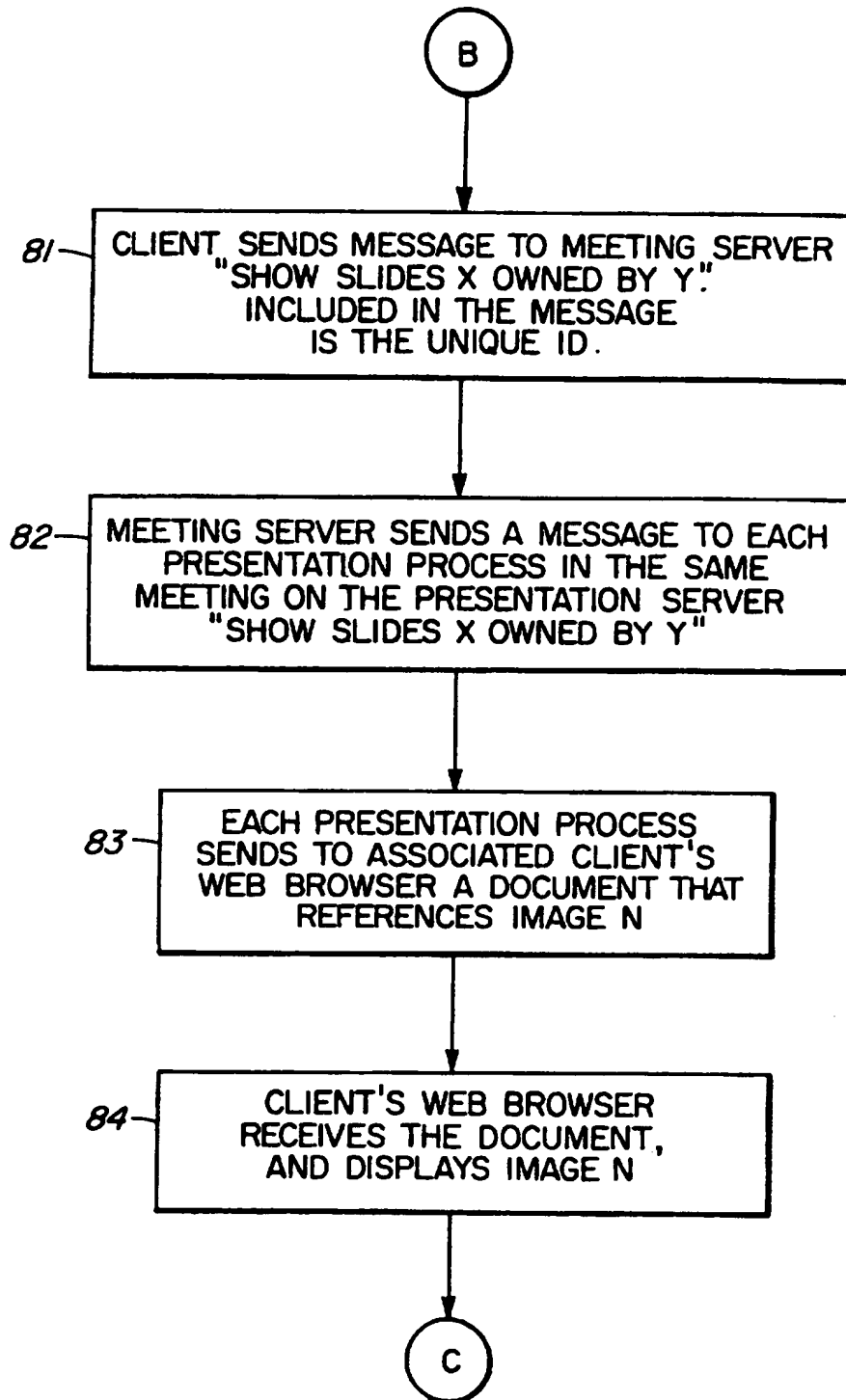


FIG. 5C

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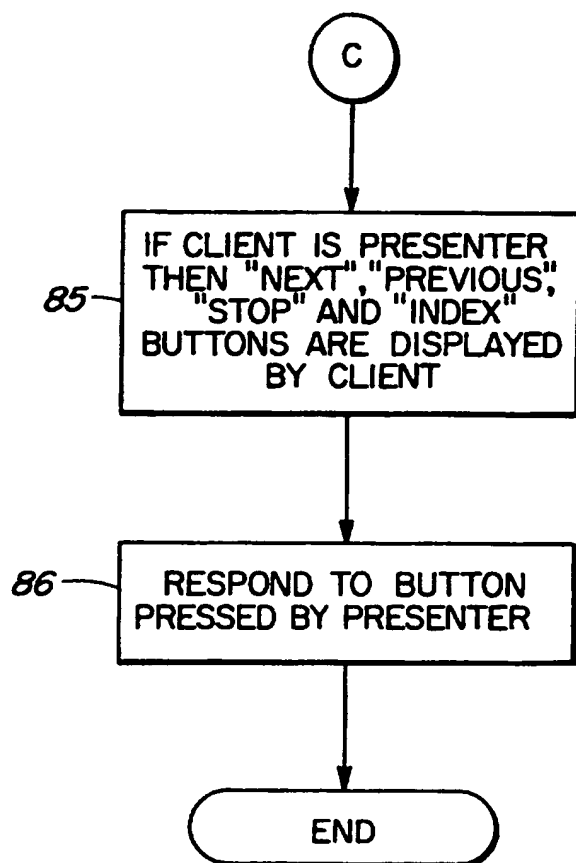
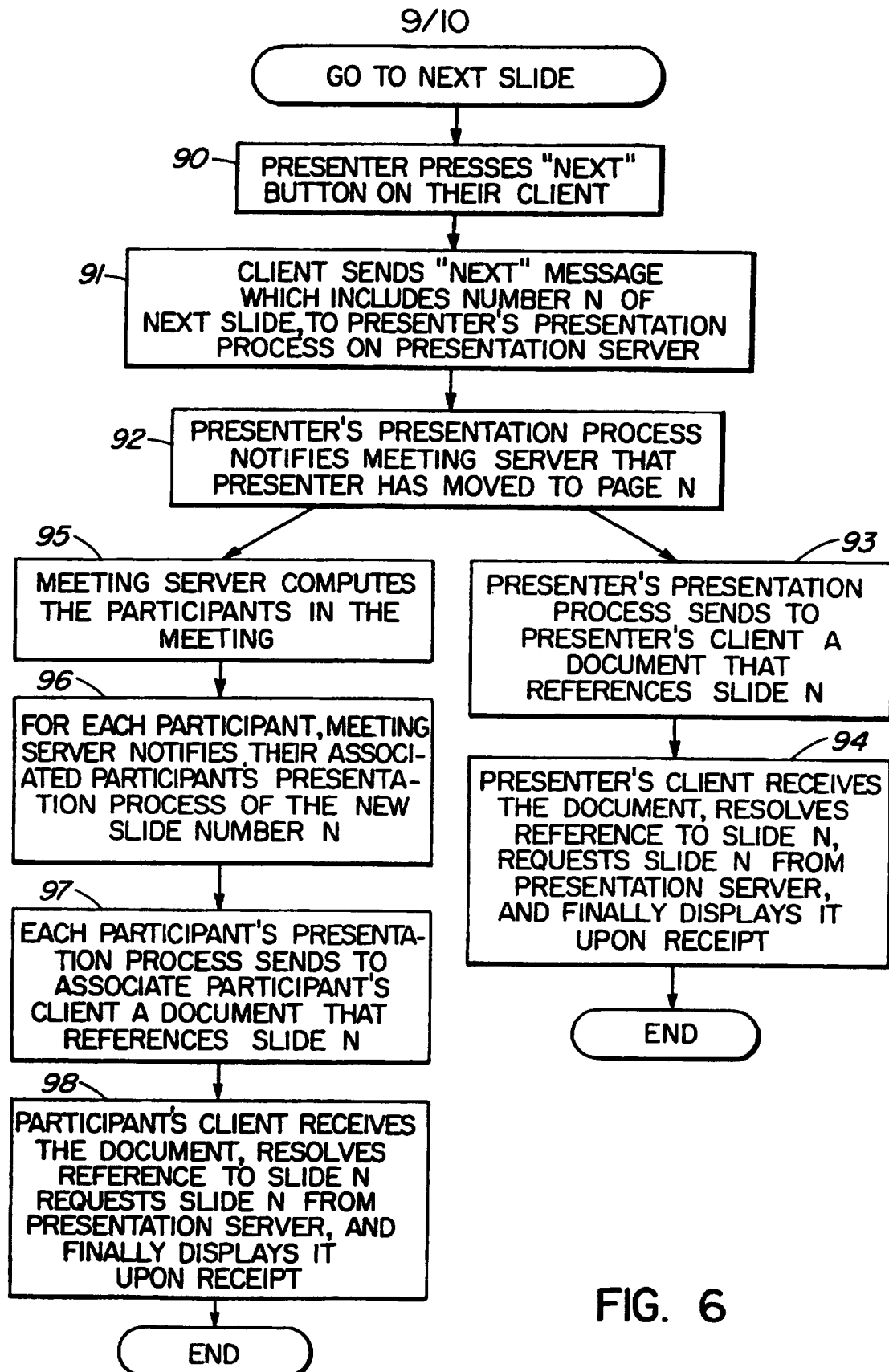


FIG. 5D



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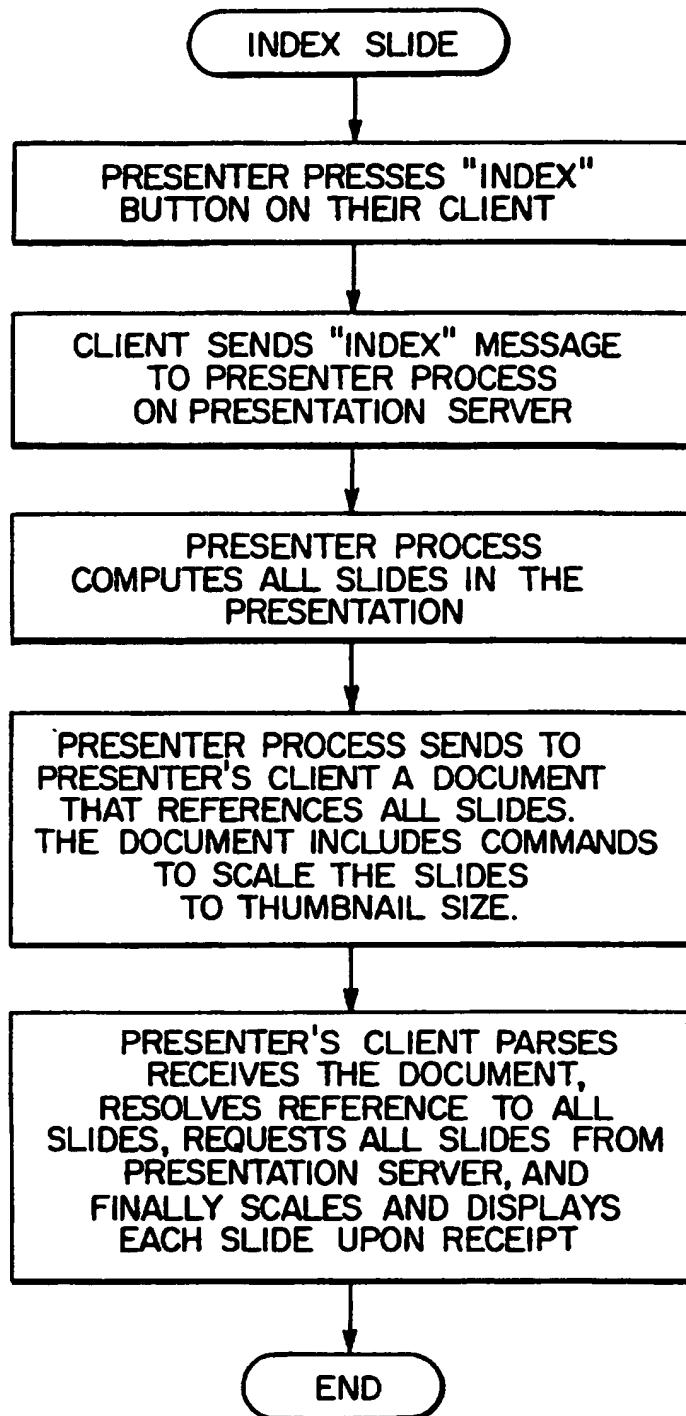


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 97/00204

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M3/56 H04L12/18 H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 392 400 A (BERKOWITZ DAVID B ET AL) 21 February 1995 see abstract see column 5, line 19 - line 55 see column 9, line 52 - line 56 see column 11, line 3 - line 60 see figures 3,,4A,10B	1-3,10, 11
Y	---	4,6,7,9
Y	GB 2 282 506 A (VICOR INC) 5 April 1995 see page 13, line 21 - page 14, line 5 see page 21, line 1 - page 28, line 28 see page 32, line 12 - page 33, line 10 see page 39, line 20 - page 41, line 16 see figures 28-31D ---	4,6,7,9
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

13 August 1997

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INTERNATIONAL SEARCH REPORT

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PCT/CA 97/00204

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Intern al Application No

PCT/CA 97/00204

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/CA 97/00204

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